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Supplement 1 to the Report of the seventh session of the

ADVISORY COMMITTEE ON MARINE RESOURCES RESEARCH

Rome, 17-24 October 1973

THE SCIENTIFIC ADVISORY FUNCTION IN INTERNATIONAL FISHERY MANAGEMENT AND DEVELOPMENT BODIES

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME, 1974

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PREPARATION OF THIS REPORT

This is an edited version of the report of the ACMRR Working Party on the Scientific Advisory Function in International Fishery Management and Development Bodies raised by its members present at the Seventh Session of the Advisory Committee on Marine Resources Research (ACMRR). Special attention was given to the management and development of fisheries based on natural stocks of marine fish. This version was considered by the Seventh Session of ACMRR after which the Committee suggested editorial changes, and recommended its publication after further review by the Secretariat, together with an informative abstract.

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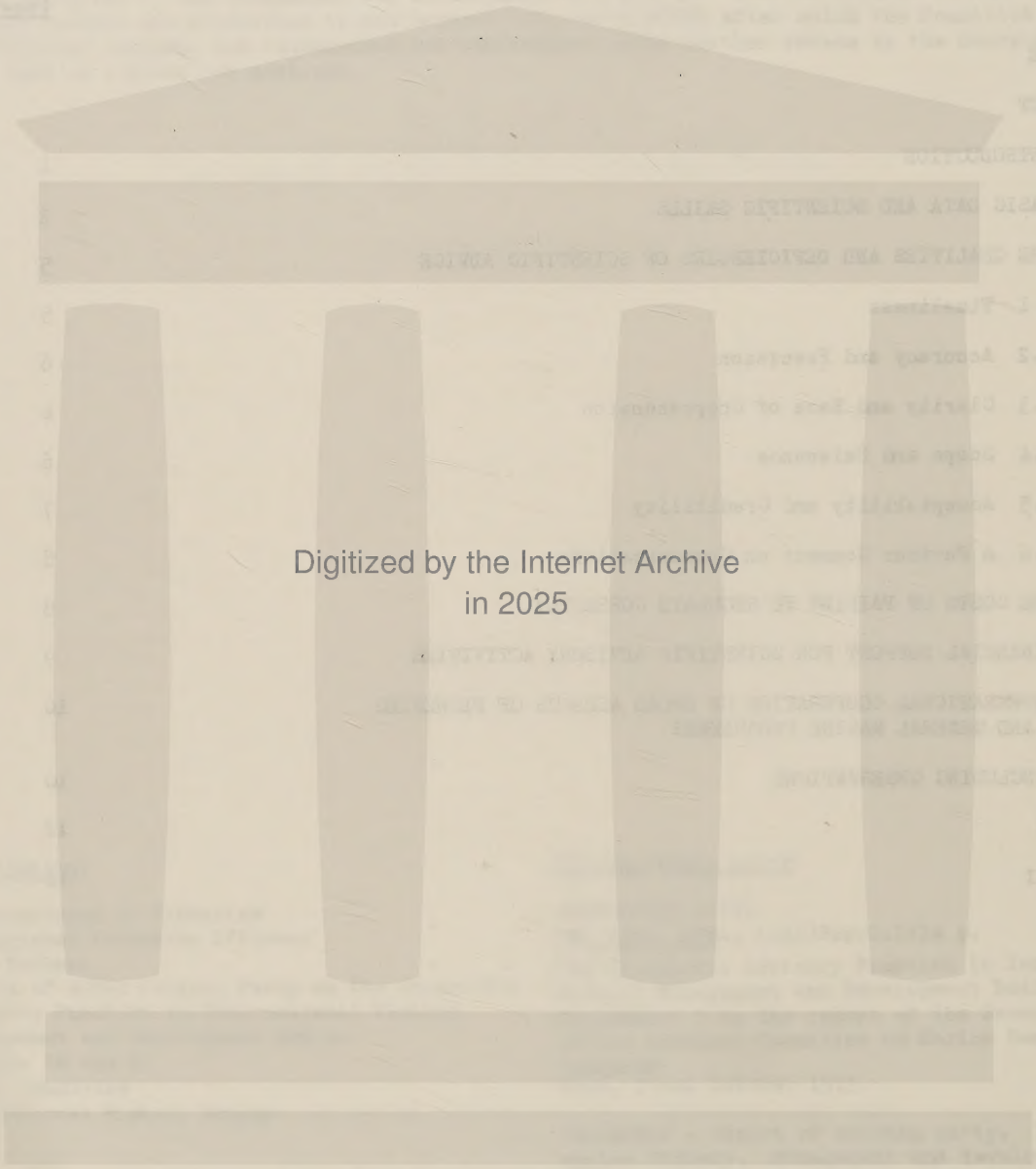

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PREFACE

The FAO Advisory Committee on Marine Resources Research (ACMRR) established, at its Sixth Session 10-17 March 1971, a Working Party of scientists, to serve in their personal capacities (Annex I) with the following terms of reference:-

(a) Identify the kinds of scientific data and advice required by fishery management bodies at different stages in the development of fishing operations.

(b) Define the action and estimate the funds necessary to promote the collection of data and conduct the research necessary to provide this advice.

(c) Establish the procedures required to ensure the efficient supply and timely application of this advice in an objective and usable form, keeping in mind the need for:

  (i) identifying major problems of fisheries management;

  (ii) examining existing methods, models and forecasting techniques used in fisheries management, so as to identify the deficiencies in these, and proposing extensions as well as new techniques and methods which will be responsive to contemporary and future changes in technology;

  (iii) evaluating the impact on growth and management of fisheries of possibly changing management regimes which may result from the 1973 Conference on the Law of the Sea.

The stimulus for this action by the ACMRR in part originated in the conclusions of an earlier Working Party on "FAO Regional Fisheries Councils or Commissions", which met in July 1968 and made a number of recommendations, largely endorsed by ACMRR and implemented by FAO as far as resources permitted. These recommendations were published as Supplement 2 to the Report of the Fifth Session of ACMRR. Many of them, such as the call to FAO "to increase the financial and staffing support available to its regional councils and commissions", were relevant to the present study.

More specifically, however, the subject of scientific advice to fishery management and development bodies was raised during the course of the ACMRR/SCOR/WMO(AC) Working Party on the Implementation of the UN Resolutions on the Resources of the Sea (Marino and Rome, July 1967). Notes on the criteria for such advice were prepared then, and in due course developed into a Working Paper for the Fifth Session of ACMRR. In particular, the financing of research required for rational fishery development and management was discussed, and attention was drawn to the lack of money to do the research upon which, and only upon which, rational decisions can be made. This was especially the case with respect to the new international fisheries bodies then being set up, for which the required research funding was not being provided at the national level, at the international body level, or through FAO.

Despite the scientific progress made, and the regulatory achievements of some of the more mature regional fisheries organizations, the ACMRR agreed that fishery science was still inadequately equipped to deal with the existing array of fisheries problems, much less those that were rapidly being created by ever-increasing new fisheries pressure ... "New scientists educated to deal with such matters have not been, and are still not being, trained in the developed and developing nations as rapidly as the problems are being created by the nations which are creating new fishing effort." The ACMRR was, indeed, deeply perturbed by the consequences of changes in the nature of the fishing processes that had occurred in recent years, especially as regards the rapid deployment of fleets of specialized vessels on first one stock and then another, all demanding more intensive study, and especially the more speedy provision of scientific advice.

The Working Party on Scientific Advice to Fishery Management and Development Bodies worked mainly by correspondence, but met once in Rome, 13-18 November 1972. Several members also took part in the special discussion of this subject on the occasion of the Seventh Session of ACMRR in Rome, 17-24 October 1973. In the introduction to his interim report (July 1973) on the activities of the Working Party, its Chairman, Dr. C.E. Lucas, wrote "It was not possible in the time available to deal with the whole of the remit, and it was necessary to be selective as regards the problems tackled.

The Working Party therefore concentrated on those matters concerning the management and development of fisheries directed to natural stocks of marine fish, especially on the more acute international and organizational problems.

The Working Party decided not to engage in a detailed discussion of the intended scope of its work. It did however interpret 'scientific' in its terms of reference as referring essentially to the natural sciences, recognizing nevertheless that socio-economic factors need often to be taken into account in formulating scientific advice, even for the prediction of the physical/biological effects of proposed measures. Likewise the 'bodies' considered were primarily international marine fishery bodies, but relevant experience from some national fishery bodies and from international inland fishery bodies has been taken into account."

A progress report by the Working Party was distributed on the occasion of the FAO Conference on Fishery Management and Development (Vancouver, February 1973) and at the Eigth Session of the FAO Committee on Fisheries (COFI), April 1973. Subsequently, ACMRR, at its Seventh Session observed that although the Working Party "had analyzed the needs for advice and the deficiencies and problems of current arrangements, and had thus laid the foundations for the envisaged study, it had not yet looked at the implications of its analysis either for the structures and procedures of advisory arrangements of international bodies, or for the scope, pace and co-ordination of the research which those bodies must promote."

However, ACMRR decided to prepare the present document, based mainly on the interim report of the Working Party for immediate submission to the Director General of FAO and for prompt distribution to, among others, the delegates to the UN Conference on the Law of the Sea (Caracas, Venezuela, mid-1974), to COFI, and to the various fishery bodies, with the suggestion that they might "interpret and use it each according to their specific situation".

Lastly, the ACMRR emphasized that "there remain important items in the terms of reference requiring further evaluation and study, especially the arrangements and procedures for supplying scientific advice, and the adequacy of the research and scientific assessment methods on which the advice is based." Studies of these aspects are continuing under the guidance of the officers of ACMRR and its Secretary.

G. Saetersdal
Chairman, Advisory Committee on
Marine Resources Research

THE SCIENTIFIC ADVISORY FUNCTION IN INTERNATIONAL FISHERY MANAGEMENT AND DEVELOPMENT BODIES

ABSTRACT *

After a preliminary discussion of decision-making problems and procedures in international fisheries, in which reference is made to several earlier ACMRR and FAO documents, the authors of this report point out that since the late 1950's, when the last round of UN Conferences on the Law of the Sea was being held, there have been a number of major changes in the sea fisheries of the world. The years between that time and the eve of the new UN Conference on the Law of the Sea have seen a great intensification of fishing, on a global scale; more mobile fleets and more participating nations; many more fish stocks fully, or even over-exploited; interactions between fishing activities in one sea region and another; growing interactions between fishing and other uses of ocean space; big changes in the legal status of various geographical zones of the sea and sea-bed; and the coming into existence of several more regional fishery bodies.

As fishing pressure on the natural resources has increased so also have the complexity of regulatory measures and the stresses on the scientific advisory system on which those measures are largely based. More accuracy and certainty is now demanded in the advice, more options must be explored, account must be taken of more of the factors which affect each fishery (including, explicitly, social, economic and environmental factors); even the credibility of the scientists involved has, on occasion, been put to severe test and the advisory and management system itself placed in jeopardy. The new fishery bodies are often very quickly reaching critical stages at which they need to take important management decisions.

In the light of the above analysis of the situation, the ACMRR Working Party on the Scientific Advisory Function in International Fishery Management and Development Bodies considered the basic data and the skills required to obtain the scientific results evaluation which provides the basis for advice. It observed that "failure in the supply of data is the most universal among the reasons why scientific advice may fall short of what is needed in a particular situation." Much of the data must come from commercial fishing operations, and besides reiterating the well-known, but often still unfulfilled, requirement that all fishing countries should contribute regular, up-to-date statistics of catches (broken down by kinds of fishes, area of catch and kinds of fishing equipment), the report goes further in proposing that "any country which plans significant exploitation of a new stock or a large expansion of an existing fishery should submit evidence that the proposed effort is reasonable compared with the potential of the stock." Further, each country interested in a particular stock should carry out research on it in proportion to that country's interests and national resources and make the results of research available promptly. Effective management requires some data collected independently, and in advance, of the fishery itself, particularly to predict the future abundance of the stock. Developing countries now interested in growing marine fisheries particularly need help in conducting research and evaluating the results they and others obtain. International and bilateral aid programmes are contributing, but it is too often forgotten that in the more advanced countries the few scientists directly concerned with resource evaluation are supported by a much larger number of scientists and institutions dealing with a large range of marine problems and other relevant disciplines. Developing countries continue to be at a great disadvantage in this matter even when they each have a few trained specialists available; there is no easy way round this, but the report suggests especially that the newer fishery bodies having both "developing" and more advanced Member States, should have small scientific staffs to supplement the contribution of national scientific groups.

It is in any case the responsibility of the international bodies to compile and publish contributed data in timely fashion. Particularly the bodies established under the FAO Constitution are deficient in this respect, the reasons being chronic shortage of staff and funds. The Working Party estimated that about one million dollars would be needed annually "to ensure that the (7) regional bodies associated with FAO can carry-out the minimum basic tasks required for the provision of scientific advice to these bodies on questions of fishery development and management". (This does not, of course, include either the global services provided by the FAO Department of Fisheries, or the costs of research itself, whether carried out by national or other institutions, or the purely administrative activities of the seven bodies). The amount quoted is more than ten times the current rate of funding.

* Prepared at the request of ACMRR by the co-opted member of the Working Party, Sidney J. Holt.

The Working Group reiterated, in its "concluding observations" the financial/staff problem, but also suggested concrete ways in which FAO can help. Firstly, it pointed out that very few states participate in more than a few of the existing international fishery bodies, and therefore that FAO, by continuing to be represented at the working sessions of most of them, could most usefully assist in communication of relevant events, decisions and factors and considerations behind those decisions, among the world community, as well as by building up a comprehensive archive. Secondly, FAO should continue, energetically and within the framework of the "Earthwatch" proposals from the UN Conference on the Human Environment, the global appraisal of the state of fishery resources, begun a few years ago, and issued in connection with the Indicative World Plan for Agricultural Development. In addition, of course, the Committee on Fisheries provides a unique forum for consideration by governments of world fishery problems of all kinds, and the ACMRR with itself, and through its Working Party, now try to apply the analyses made of the scientific advisory function to see the implications of its findings to the form, structure, and procedures of international fishery bodies. The present report also points out that fishery research now must be related closely to other marine environmental research programmes of broader scope, especially as the advisors find they have to bring to bear a wider and wider range of scientific results on the questions with which they are faced, be these of relationships between several exploited species which might earlier have been treated as if they were quite independent, the effects of pollution or of other economic operations in the marine environment.

In the main body of its report the Working Party analyses a number of inter-dependent "qualities" of scientific advice, the deficiencies in these, and the means of improvement. It affirmed that advice has frequently fallen short of needs in timeliness, in accuracy or precion, in clarity and ease of comprehension, in its scope and its relevance, and in its acceptability (to decision-makers, who often have no scientific background). Although admittedly imperfect advice has naturally often been useful, and advice has often been quite adequate to the occasion, it was suggested that an analysis of deficiencies known from experience would help "devise advisory systems and procedures appropriate to new situations." Lateness of advice can arise from failure to recognize a problem early or, better, to anticipate it; from the awaiting of statistical data and the processing of biological materials; and from failure of scientists to agree on the evaluation of the results. A suggestion made by the Working Party is that the evaluations made for the purposes in question should be issued formally as a category of public documents to which authors' names are attached, but which are clearly labelled as to their provisional state. Also advice might be offered with less hesitation if it were better understood that failure to do this, or for a regulatory body to adopt a proposed measure, is an action having as clear and predictable consequences for the fishery as a decision to adopt a specific measure. The Working Party concluded that the pursuit of further accuracy is generally a good thing, but that to seek great precision can be wasteful of time and energy. Sometimes, however, the warding of conventions under which fishery bodies are established, or their procedures, force the advisors to seek greater precision than is necessary, or even possible.

Several times the Working Party returned to the need for more dialogue between natural scientists, administrators and representatives of industry, particularly when they were considering the apparent "relevance" of advice. A serious weakness of advice can be its too narrow scope, but when scientific groups see the need to explore the situation confronting a fishery far beyond the limits of the questions originally put to them, they have a responsibility to express their comprehensive statements in comprehensible language. On the other hand industry and administration must recognize the need for some openness in the consideration of economic and social matters - without this they risk getting scientific advice which is not entirely to the point. Going further, the Working Party suggests that the process of providing scientific advice, and perhaps the decision-making process itself, should, in international fisheries, be open to the public. Further, the responsibility of scientists does not end with the enactment of a regulation; monitoring its effect is as essential to the welfare of the industry as any of the preceding activities. The report states clearly that "it is to the benefit of fishery development and management that the advisory groups themselves remain the judges of the proper scope of their advice. The most useful advice has often proved to be that which answered questions broader than, additional to, or even different from those originally posed."

Considerable attention was paid to bias (and suspicion of bias) in advice and how to minimise or eliminate it, or nullify its effects, through appropriate structures and procedures of both the decision-making and advisory bodies. A task for FAO, or perhaps for COFI is to try to help where "scientists have been unable to agree, where the parties to a regional fishery body are sharply divided as regards management needs, or where the effectiveness of a body is challenged by major elements of the international community."

A short section of the report on "The costs of failing to regulate correctly" shows that the economic desirability of providing good advice and acting on it, is a trivial matter: studies of the regulation of whaling, and of fishing in the Northwest Atlantic, show that inadequacies in these cases alone have cost the world community hundreds of millions of dollars annually. Yet these quoted situations are ones where regulations have definitely had some good effects, in other cases, not yet analyzed the losses through failure to take appropriate management measures have been much greater. Further case studies are needed to press home this crucial point.

1. INTRODUCTION

Because of the nature and circumstances of fishing operations and of the natural characteristics and legal status of most of the living resources now being exploited, the management of those operations requires access to a wide range of information. The facts on which a fishermen decides about the operation of his boat, those on which fleet managers and plant operators make their decisions, and the facts on which regulations of high-seas fisheries are formulated by international bodies, form an array of information which decision-makers at each level of fisheries management and administration interpret each according to their own needs. Their decisions do not, however, result simply from a compilation and analysis of data. Only some of the considerations upon which decisions are based can be represented in quantitative terms, and often only a few of those are certain and unquestionable. This is especially the case of fishery situations, and the quantitative data and qualitative statements concerning a particular situation have to be interpreted and evaluated together. Further, because fishery situations always involve social and economic elements, for which it is difficult and often impossible yet to obtain quantitative measurements, the taking of a decision requires that the input from scientific research be such as to assist judgement of the likely outcome of each of the alternative courses of action open to them. Thus, it must include adequate measures of the variability of the investigated system, and clear designation of the uncertainties of the results.

The formulation of advice, by interpreting research results to evaluate outcomes of various courses of action is a difficult task in any fishery situation but is especially difficult where international bodies seek to propose regulatory schemes, the matter being complicated by technical differences between participating fleets, and by economic, social and political differences between the countries. Moreover, the complexity of such situations is rapidly increasing. Several distinct, but inter-related, factors in world fisheries set a scene quite different from that of the late 1950's, when the first series of UN Conferences on Fishery Resources and Law of the Sea were taking place. These factors are:

(i) the continuing growth of fishing effort on a global scale, which is steadily transforming the picture from one of general development needs, with local over-fishing problems, to one of general need for management, with decreasing opportunities for unregulated expansion;

(ii) the mobility of fishing effort, at least for some kinds of operation, and of investment;

(iii) the technical and economic possibilities of very rapid build-up of effort in particular fisheries leading to far more urgency for management decisions; and

(iv) the changes in the legal regime pertaining to marine fisheries, and interactions between sea areas.

In addition there are emerging problems concerning multiple resource-use conflicts in "ocean-space". Individual countries are increasingly having to face national decisions on multiple use, and it is inevitable that international problems will arise, requiring the evolution of a mechanism for coordinated decision-making. In some areas countries are considering the possible forms of such mechanisms. They can only be successful to the extent that adequate and coordinated scientific advice is available; means will need to be sought for ensuring this.

The pressing need to combat poverty and especially to improve nutrition in the developing countries gives fisheries' development a special urgency in many regions. In all regions the growing fishing power of the world makes an ever stronger threat to the fisheries resources. These factors make effective regional management bodies urgently necessary, because both development of fisheries and their regulation to maintain maximum productivity require understanding of the abundance of the fish and how, why, and when, it changes.

The changes in advice made necessary by changes - now often very rapid - in the fisheries, are illustrated by events in the Northwest Atlantic. Until recently the main management issues seeming to face the Northwest Atlantic Fisheries Commission (ICNAF), and hence the kinds of scientific advice sought by it, concerned relatively unrestrictive regulatory measures aimed at controlling the size at which fish first become liable to capture, e.g. by mesh regulation. But with the rapid increase in fishing intensity in the area especially during the 1960's, the Commission's interest moved to measures necessitating much more effective controls of fishing, e.g. catch limitation with country allocation.

We can with confidence say that:-

(a) sooner or later virtually all fisheries progress to the stage at which management is needed and this process is speeding up dramatically;

(b) the regulatory measures contemplated would relate more and more to explicit major socio-economic goals;

(c) there is an understandable, but misguided, tendency to delay decisions which would have a relatively severe impact; experience shows that such decisions become necessary eventually, and the longer delayed the more they hurt;

(d) the advisory system will be placed under increasing stress as it is more and more concerned with measures having greater impact: more accuracy will be demanded, more options needed to be explored, more factors taken into account and, in extreme cases, even the credibility of advice and the integrity of the scientists and of the advisory system, placed in jeopardy.

Existing regional bodies are at various stages of development. Some are well established, with membership including countries with a high level of scientific skill, and are already actively engaged in fishery regulation. At the other extreme are regional bodies in a formative stage, with membership mainly of developing countries, and giving attention to "development" rather than management of fisheries. As illustration, however, of the pace of change noted above, some recently established bodies are facing problems of over-fishing and corrective regulation very early in their lives - e.g. International Commission for the Southeast Atlantic Fisheries. Some needed regional bodies still do not exist. The need for sound scientific advice and for its effective communication to the policy-makers of the member countries is, of course, common to all bodies. The problems of the newer bodies do, however, differ from those of the longer established ones, and in a sense are more urgent, because there is no region of the world where an active body capable of effective fishery regulation will not be badly needed in a very few years, and equally will need advice drawing on a broader and broader sweep of scientific studies.

In view of this situation fishery management and development bodies may be asked, in the first place, what kinds, qualities and priorities of research results are necessary for the formulation of advice appropriate to each fishery according to its state of development. This first question raises two other questions: what kinds of research should the management and development bodies seek to promote so as to ensure the availability of the needed results; and what would be the costs of those promotional activities? In the second place, one may enquire as to what procedures, effected through what institutional structures, could best be adopted:

- to ensure that requests for advice are well formulated, in relation to major problems of fishery management;

- for effective promotion of the indicated research programmes;

- for securing effective and timely application of research results through the employment of appropriate managerial models and techniques; and

- to take account of the new situation that will prevail after the UN Conference on the Law of the Sea.

Consideration of the procedures for effective application of research results raises further questions concerning the adequacy of the models implicit in the present management of fishery operations and as to the means of making them more effective.

2. BASIC DATA AND SCIENTIFIC SKILLS

This report, being concerning with the evaluation of scientific results and the formulation of advice based on them, cannot neglect the problems of obtaining these results in the first place. The ACMRR has, in other studies, reviewed the important questions of the training and education of fishery scientists, the provision of research vessels, laboratories and other scientific facilities, and the very wide range of data requirements for fishery development and management. Hence reference is made only to certain matters closely connected with the advisory function in its international aspects.

Failure in the supply of data is the most universal among the reasons why scientific advice may fall short of what is needed in a particular situation. Also, the available data are too often inadequate, inaccurate, incomplete, or supplied too late to enable scientists to perform their tasks properly, so that improvement in the collection and compilation of data has a high priority. This will inevitably require increased expenditures, nationally and internationally, in order to reach the desired standard. However, not infrequently a high level of precision has been assumed to be necessary, and the consequent high estimates of likely costs have inhibited the implementation of appropriate data collection systems. Sometimes, depending on the stages of development of the fishery, useful initial advice can be formulated from quite rough data. For example, a very simple assessment may be sufficient to determine that the current yield is well below the sustainable yield, and that some expansion in the fishery would not be injudicious. Equally, it may be sufficient to establish that the current effort is grossly in excess of the desirable level, to justify action to make some reduction in effort. Also, although certain types of data are costly, other types are not. Accordingly considerable improvements in the data supply (though still with significant gaps) could be achieved without very great increase in expenditure.

In view of the importance of basic data, and the losses through wrong or delayed decisions that are inevitable without adequate data, it should be the responsibility of any country exploiting a fish stock that is (or might be) exploited by any other country, to supply certain minimum data to the appropriate regional body. Further, any country which plans significant exploitation of new stock or a large expansion of an existing fishery, should submit evidence that the proposed effort is reasonable compared with the potential of the stock.

The most important single source of data is the commercial fishery. The minimum data, to be obtained from all fishing countries (irrespective of whether they happen to be members of the international bodies concerned) include regular, up-to-date statistics of catches, broken down by kinds of fishes, area of catch, and kinds of fishing equipment used. In addition data permitting some measure of the fishing effort are essential.

It is equally the responsibility of the international bodies to compile and publish such data in appropriate and timely form. Unfortunately, this is not always done, and the regional councils and commissions established under the FAO constitution are particularly deficient in this respect - mainly because of the chronic shortfall in staff and funds.

In addition to data submission, it should be the responsibility of each country interested in a fish stock to carry out research on that stock in proportion to the country's interests and national resources, and to make the results of that research promptly available through published documents and reports to the appropriate regional body.

In the past, scientific advice has been based largely on the analysis of data (especially catch and effort statistics) collected during development of the fishery. The pace of modern fisheries development is now such that if scientific advice is based on such data only, it will almost inevitably be available too late to prevent serious losses from over-expansion. Effective management therefore requires some data collected independently, and in advance, of the fishery itself. These data should be such as to provide estimates of the magnitude of the standing stock, and of the potential yield from it. Such data are, of course, also invaluable in planning the rational development of the fishery, as well as, ultimately, in any management action.

Manuals and technical papers produced by the FAO Department of Fisheries, and many other documents, help to specify the various kinds of information that may be required, or be helpful, in a wide range of situations. Some such requirements - for example, the size distribution of fishes in catches of a certain species - are rather simple and unambiguous. Nevertheless, the need must be emphasized for careful calibration and cross-checking before such data can be used unreservedly for scientific assessments, or before data from different sources are added together. For example, reported statistics which are nominally of catch are in practice more often of landings; the difference can be very significant. Thus an important function of any regional body is to ensure that checks and reviews of the basic data are carried out regularly.

Other data which can be very important in managed fisheries are early predictions of the future abundance of the stock, particularly as it may be affected by variations in the annual recruitment of young fish. Such predictions are almost essential when the management regime is one of catch quotas, and such a regime - including allocating portions of the allowable total catch to countries or other entities - seems likely to be the major form of management in the future.

In selecting certain kinds of information, such as catch statistics, for mention, it is not intended to imply that any or all of these provide a sufficient basis for appropriate advice. On the contrary, although some kinds of data are necessary in practically all conceivable international situations for which advice is required, analysis of each situation also calls for additional, and often very diverse, types of research results. These may include knowledge of a wide range of relevant environmental processes and of aspects of the biology of the fish, the latter ranging from taxonomy and anatomy to biochemistry, physiology, behaviour and other fields of functional biology.

Turning now to the question of scientific manpower, it is recognized that there is a scarcity of fishery resource scientists in general, particularly - but not only - in developing countries. This in general is a matter of education and funding posts, which are large questions considered by ACMRR and COFI. The scarcity is, however, also a problem of attracting recruits, a certain lack of interest perhaps being connected with a failure to associate research with speedy and practical applications in terms of food production, industrial development, effective management, etc. This in turn suggests that the objectives of fishery research may sometimes be poorly defined.

Advice must often be drawn from expertise in a wide range of scientific and technical fields, such as marine biology, biological, physical and chemical oceanography, fishing technology, mathematics, applied acoustics, etc. The degree of understanding by fishery scientists of the practical aspects of fishing operations, and of the ecological and socio-economic factors influencing them, will to a large extent govern their ability to provide relevant scientific advice in terms of development and management goals. To improve its attractiveness and, hence, recruitment to it, fishery science might well be presented as a practical sector of environmental science.

There is still an urgent need to provide developing nations with expertise in fishery conservation science and practice. In the long run this must be accomplished by training local experts, but this is a long process and fishery problems will seldom await its completion. In the short run this need can only be circumvented by temporarily providing expatriate scientists, either on the staff of local agencies, or seconded from elsewhere (such as by FAO), or on the staff of an international commission of which the nation is a member. It must be remembered, however, that in the more advanced countries, the rather small group of scientists who serve as advisers to their own governments or who serve on international advisory bodies, draw upon a very much larger pool of expertise in practically all the relevant sciences. This is not so in developing countries and the implications of this should be taken into account when considering the structure and working arrangements of newer international bodies whose members are either practically all developing countries or - and perhaps more critically - are drawn from both groups of countries. It is almost certainly not sufficient merely to copy the mechanisms which work with more or less success in areas such as the North Atlantic (and there are deficiencies there too, as has been made clear elsewhere in this report), supplemented by a certain amount of technical assistance to the developing members; special structures and arrangements may also need to be devised.

National bio-statistical data must be made available on a current basis, information pooled, and some agreed form of processing and analysis carried out. This should be the responsibility of the secretary of a permanent working group, or of the secretariat of a regional commission, or of the secretariat of FAO as the case may be. The further processing and evaluation of such data should then be made by a group of scientists whose membership desirably includes scientists of all the countries concerned. In the developing world, however, where experienced fishery scientists are not only rare, but are often occupied with administrative matters, the provision of a staff of scientists attached directly to the international fishery body may be the practical solution. The main obstacle is the lack of money. The developing countries do not have it, and FAO has not so far been provided with funds or staff to service such bodies adequately. That is just one reason why FAO regional fisheries councils and commissions have not been more effective. The United Nations Development Programme, began in 1970 an experiment to provide funding under such conditions for the Indian Ocean Fisheries Commission; it is still too early to estimate success or failure but some solution to this problem has to be found.

Regional commissions should as a matter of priority coordinate all national research programmes on resource evaluation, and they need scientists for this. Such coordination may be especially needed for work containing important elements of costly research vessel time. Another important function of a commission is to assist further scientific education, and research, by the organization of regional scientific meetings, symposia, workshops, exchange of scientists, publication of reports, etc., and funds for these activities must also be given high priority in budgeting.

Accordingly there appear to be several mechanisms available for improving recruitment of scientists, both in quality and quantity, and for furthering agreed evaluation of the scientific basis of fishery conservation problems. However, all need money to work, to maintain the regional body in being, to do the research (both national and international), and to support the scientists who are needed to evaluate the results.

3. THE QUALITIES AND DEFICIENCIES OF SCIENTIFIC ADVICE

The previous chapter discussed two factors deficiencies which are responsible for certain inadequacies in advice offered by scientific groups in international fishery bodies. Such advice has frequently fallen short of the needs in one or more of several different ways - in timeliness, in accuracy or precision, in clarity and ease of comprehension, in its scope and relevance, and in its acceptability. This should not be taken to imply that such advice has always, or even usually, been inadequate, or that admittedly imperfect advice has been useless. Nevertheless, we can expect that, with wider participation in fisheries and growing pressure on fishery resources, the deficiencies will become more rather than less important. An analysis of deficiencies known from experience should help to overcome future problems, and particularly in devising advisory systems and procedures appropriate to new situations.

Responsibility for deficiencies may be found at all levels in the process of collecting data, expressing scientific results, formulating advice and taking decisions based on that advice, implementing the decisions and enforcing the measures adopted. The qualities in the list above apply at all levels, and they are also overlapping and interdependent. Here we focus on problems at the level of advice formulation, but necessarily refer also to those at other levels.

3.1 Timeliness

In many instances a consensus is only reached, and advice formulated, later than the critical time necessary to ensure an appropriate regulatory action after a new and potentially deleterious development or trend has been identified. This failure is particularly deplorable in view of the further delays that invariably arise in the decision-making and legislative stages. However, the significance of delay varies enormously among fishery situations: recognition of a recruitment failure in a quota-controlled fishery may not be possible until a few weeks before regulatory adjustments have to be made; in other cases a delay of a year or more may make no substantial difference to the course of the fishery.

Lateness can have many causes. All the following causes have played a part in real situations and they also are inter-connected:

i failure to recognize the problem early or, better, to have anticipated it;

ii need to await pertinent statistical data;

iii time taken to process biological materials and data;

iv failure of scientists to agree on the evaluation of results.

To improve timeliness it is necessary to examine each situation to determine the limiting time factors. Some of the delays might then be reduced by reorganizing part of the data collection and evaluation system, or by introudcing new research and analysis techniques. In some cases more scientific or technical manpower may be the key. In addition, it may be necessary for the attitude of scientists to change so that they are more ready to offer advice - possibly in the form of a range of statements - on the basis of less than complete data and full and verified analyses. After all, even the most detailed analyses can have only a predictive probability. This can raise problems, however, to the extent that the stature of the individual in the scientific community still depends on the quality - including carefulness and durability - of his published work. Haste in formulating advice also, in the longer run, places stresses on credibility, because this continues to rest on the critical judgement, by the scientific community at large and by subsequent test and verification, of the data and conclusions thoroughly worked out in published papers. Nevertheless, since we believe that the evaluations, provisional as they may be, on which advice and subsequently decisions are based, must be made generally available, and promptly, a solution must be found. This may be in the more formal designation of a

category of public documents to which authors' names are attached, but which are clearly labelled as to their condition and purpose. Also, there may be less hesitation to offer the best possible advice, at any given time, when it becomes more fully understood that failure either to do this or for a regulatory body to take a proposed measure is - whatever the reason - an action having as clear and predictable consequences for the future of the fishery as is a decision to adopt a specific measure.

3.2 Accuracy and Precision

Timeliness, accuracy and precision are strongly inter-related. Furthermore, the need for such qualities changes during the process of development of fisheries, usually becoming greater. In few cases is it possible to assign statistical measures of accuracy to fishery assessments. Nevertheless, by looking for inconsistencies in the results of several methods and approaches to a problem, and by other well tried means common to all science, one can often feel secure in the general accuracy of a particular statement and make judgements of the direction and order of magnitude of possible error. The pursuit of greater accuracy is generally good within the limits of the time available; the drive for greater precision may be wasteful of time and energy. A problem here is that the international conventions themselves, by their wording and their methods of implementation, sometimes force the advisory groups to seek greater precision than is necessary, or even possible. It should be borne in mind that the precision of an assessment from a particular model depends essentially on the least accurately measured of the factors represented in the model.

Excessive precision is the enemy of other desirable qualities, but especially of timeliness, and also of economy of research effort. It is often satisfactory to achieve confidence in general accuracy and to accept low precision; clear explanation of this distinction by scientists to decision-makers may encourage them to act on the basis of "best-available" estimates. At the same time scientific groups need to evaluate a range of options, with their consequences, including especially the very different consequences of acting on "pessimistic" or "optimistic" assessments. Greater accuracy will be obtained through the same improvements as would achieve timeliness - availability of better and more prompt statistics, development of new techniques, and above all early recognition of emerging problems so as to give more time for evaluation.

3.3 Clarity and Ease of Comprehension

The manner in which scientific advice is presented is of importance for its acceptability in various ways. Scientific advisors do not always use a form of language that decision-makers understand. This situation can be improved by more opportunity for dialogue with the administrators, by scientific groups taking particular care in the formulation of advice, and by more decision-makers having some understanding of scientific method and terminology. In general, however, we do not consider this now to be a very serious problem with respect to fishery bodies. Obscurity probably arises most often from the advisor's lack of confidence in the accuracy of the advice to be given. This may be evidence that the problem has not yet been thought through; and it may provide unconscious cover for professional reputations. Improvements might come from having more, and more experienced, scientists working in this field, by categorizing provisonal statements; and by breaking down any barriers impeding contacts between scientific and decision-making groups. When scientists strive for greater precision - perhaps more than the decision-makers ask or need - they may be doing this because they do not understand well the decision-making process. In some bodies the communication barriers are reinforced by secretiveness on the part of the decision-making groups; in the long run this is clearly harmful to effective working of the body.

3.4 Scope and Relevance

Sometimes advice offereddoes not appear strictly relevant to the purposes of the body. An appearance of irrelevance can however by spurious; this is due to a failure on the part of the advisors to achieve comprehensibility even though their formulation of the advice seems to them clear. More often, perhaps, advice appears irrelevant because of lack of comprehension in the other direction; the fault then lies primarily with the decision-makers. However, the more serious weakness of advice can be its too narrow scope. If, for example, it is limited to prediction of either short-term or long-term consequences of a proposed measure, or of internal changes in the fishery and not external changes, then decision-makers may not be helped to anticipate some indirect, but very important, consequences of the measure.

Advice should ideally be formulated so that all its implications - scientific, technological and economic - are clearly demonstrated or may be defined easily. The natural scientists are not usually in a position to assess all technological, social and economic effects of management action. One solution lies in dialogue between the natural scientists, the administrators and representatives of the industry, preferably before the decision-making stage, so as to explore all the possible consequences of the various alternative courses of action - including no action. Such a course is already often practised at the national level, whereas at the international level there is a tendency to limit discussions to biological and perhaps technological arguments, and then to pass directly to the stage of negotiations without explicit consideration of social and economic factors.

On occasions the scope of the advice is less than the advisory group would wish it to be because certain data or analyses are lacking - particularly primary economic and technical data and analyses which authorities have been unable or unwilling to provide. The understandable tendency of national and industrial interests to keep such information secret, or at least out of court, may serve some of those interests, at least in the short term, but is inimical to the overall goals of most international bodies, and ultimately to some at least of those interests themselves.

It is essential to understand that the responsibility of scientists does not end when the regulatory body has taken action. It is as necessary to continue to monitor thereafter as it was earlier in the fishery, partly as a check on whether the scientific predictions are being borne out (which applies equally if no regulation has been introduced) and partly to check whether the regulation is being (a) enforced and (b) effective. Frequently no one other than the scientists are in a position to take this action. Furthermore as in all scientific activities, such a follow-up is a unique source of information for improving the understanding of the system being regulated and hence improving the quality of future advice.

It is to the benefit of fishery development and management that the advisory groups themselves remain the judges of the proper scope of their advice. On many occasions the most useful advice has proved to be that which answered questions broader than, or additional to, or even different from the questions originally posed.

3.5 Acceptability and Credibility

Scientific advice is not always acted upon; sometimes it appears not even to be taken seriously into account. Advice may be unacceptable because it is judged unclear, irrelevant, incongruent or biased. It is, however, most often rejected or referred back to the advisors because to act upon it would present problems of enforcement or administration, for which the decision-makers are not yet prepared.

Advice is sometimes rejected because it is too narrow, or some bias is seen or suspected. As to bias, it cannot be claimed that there are no vested interests in the scientific community, but these interests may not be the same as those of the administrator with pressing regulation problems. Neither side can guarantee the validity of its view and truth is more likely to be approached by interaction between them than by isolation. The decision-makers may suspect that the advice given them has been biased by the scientific advisors coming from countries or areas different from that of the decision-makers, or by a particular discipline being over-represented among the advisors, or by individual advisors having pre-determined personal positions. It must be admitted that such biases can indeed arise and the suspicion may sometimes be justified; the structure and the procedures of the decision-making body should be such as to detect bias when it arises - and then to allow for it, or to show that the suspicion is unjustified - and thence to reinforce the confidence in the advice. Bias can also arise from deliberate or involuntary orientation of research so as to lead to a chosen conclusion, but this lies outside the scope of the present discussions.

Enhanced credibility of advice will often be a matter of personal relations and experiences, and of full and free discussion within groups chosen from both sides. Clear scientific presentation naturally helps.

In instances where the scientists are unable to agree, or indeed when the parties to a regional body are sharply divided as regards management needs, or when the effectiveness of a management body is challenged by major elements of the international community, an outside body of

experts may be established to review the actions of, and settle particular disputes within, such bodies. Here again, FAO, or perhaps its COFI, may be able to help, as in the instance of IWC in the 1960's and perhaps also in the 1970's. In any event, all countries participating in a fishery should be both permitted and encouraged to contribute fully to the advisory process, just as they can all profit from it.

On occasions advisory groups have deliberately biased their advice, by playing the game of guessing the decision-makers' reaction. Thus the group's advice becomes modulated towards what its members believe the decision-makers will find acceptable. Such action rarely has the intended results. In fact, it is usually a sign that the scope of the evaluation, and hence of the advice offered, has been too narrow.

There have been occasions when, at some critical stage "evidence" has been produced to counter the evidence considered and tendered by the scientists, and at such a time and in such form that it cannot be given due scrutiny. Such a practice is against the interests of the body as a whole, at least in the long run. Opportunity must be given for all relevant information to be taken into account within the advisory group, at such a time and in such a way that additional delays in formulating advice are avoided, particularly as, with the increasing fishing pressure on resources, such advice will become more critical, the decisions more controversial, and the problems more nearly global.

3.6 A Further Comment on Communications

Apparent difficulties within fishery bodies appear frequently to result from inadequacies or failures in communication within these bodies. There are many examples of improvement where this problem has been taken seriously, and further efforts should be made. However, the problem has larger dimensions. There are instances where the apparent failure of decision-makers results not so much from poor advice but from the failure for pressures generated by special interest groups to be balanced by pressures from other groups representing a more comprehensive and long-term view. Balance might well be achieved by efforts to popularize, hence to improve understanding of, the principles, methods and objectives of fishery science, both by administrators and by the public. Here again, the illustrative use of simple models and analogues should be encouraged. New efforts, whether involving lectures, books or articles, should be directed both towards the fisheries community and towards the general public. Indeed, it is perhaps desirable for the process of providing scientific advice (and perhaps the decision-making process itself), should, in principle, be open to the public; this possibility deserves further study, especially at this time of greater environmental awareness which can broaden interest in the problems of the use of marine resources.

4. THE COSTS OF FAILING TO REGULATE CORRECTLY

Losses in fish production because of shortfalls in scientific advice, or failure to act on such advice, may be very substantial in a major area of concern, and these possibilities are widely recognized. It is, however, difficult to pick out specific situations to illustrate this with adequate analyses. There seem to be no instances where it can be said that regulatory decisions taken have been "wrong" from almost all points of view. The commonest "wrong decision" is no decision.

Gulland[1] estimated that the actions taken by the International Whaling Commission up to 1964, poor though its overall performance in that period had been, and costly though its inaction then has proved, increased the value of Antarctic whale catches by a total of about $125 million, compared with those which would have been obtained if there had been no regulations. The increase in value that might have been obtained from more effective actions - including actions within the statutory powers of the IWC - is, however, many times that figure. One reason, among others, for the failure to take such actions was undoubtedly delayed and unconvincing scientific advice, particularly in the period before the stocks had fallen to a critical level, although a major reason was the difficulty of reconciling short-term and long-term interests in whaling.

Similarly the ICNAF "bio-economics working group" estimated in 1966 that the annual loss, in the North Atlantic cod fisheries alone, from failure to restrict the fishing effort to the optimum level (and despite the undoubted benefit of existing mesh regulations), was $50-100 million[2]. The wastage

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1/ J.A. Gulland, The effects of regulation on Antarctic whale catches. J. Cons.Int.Explor.Mer., 30(3)

2/ Report of the working group on joint biological and economic assessment of conservation actions. Rept.Int.Comm.North Atlant.Fish., Vol. 17

in this fishery has increased since then, and there are similar losses through unrestricted fishing in many other fisheries throughout the world. The current annual wastage in the total world fisheries, mainly arising from excessive costs through failure to take appropriate management measures, amounts to several hundred million dollars. Admittedly this sum could not all be saved solely by the provision of better scientific advice (since in several instances although much of the advice was adequate, and provided in reasonable time, the appropriate action was not taken), but this figure gives an idea of the potential benefits from improving the scientific advisory system and, of course, from acting promptly and correctly on the advice.

Further case studies, and more precise evaluations, would be very useful and FAO should promote them. Such studies would need to take into account the effects of regulatory decisions on stock, on quantities and values of total catches, on the profitability of the fishery, on the continuity of the fishery, on the partition of catches between participants, and in many cases on other fisheries. The studies should also include losses in the development phases of some fisheries, through decisions which were wrong but which might have been different if better scientific advice had been available at the time.

5. FINANCIAL SUPPORT FOR SCIENTIFIC ADVISORY ACTIVITIES

Countries must be urged to play an active part in research on which to base development and management of fishery resources, and to prepare themselves for the sorts of data collection and scientific analysis that will soon be essential everywhere for fishery regulation. They should receive necessary aid from international and bilateral sources. Developing countries must be enabled to take part effectively in international, as well as national, regulation of fisheries if the productivity of the fishery resources off their coasts is to be maintained. Regardless of the outcome of the current discussions of the law of the sea, in the United Nations and elsewhere, international activity in this field will continue to be necessary, because of the mobility of fish as well as of fishing fleets, and because of geographical restraints in many regions where a number of countries border the same waters.

Along with the needs of individual developing member countries for help, new regional bodies themselves need help, especially at the beginning. It is essential for FAO to have enough staff and funds to provide full-time secretariat assistance during the early years of bodies established under provisions of its constitution. It is also essential for FAO to have adequate funds to provide the services - statistics, information storage and retrieval, etc. - that are important to the activities of all bodies, but especially of those responsible for fisheries in regions where developing countries are concerned, and where more developed countries are exploiting, or likely to exploit, the living resources. In these areas the funds now provided are woefully inadequate.

Support to the scientific advisory functions of regional bodies is of two kinds: a) the support needed by developing countries to enable them to carry out their international responsibilities; and b) the direct support to regional bodies to finance secretariat duties, including, for example, data compilation and processing, carried out directly by the staff of the body. Though the second kind probably involves a smaller total sum than the first, there can be great administrative problems in securing it. Thus, both international and national funding and aid agencies are usually more willing to give support to particular developing countries than to international fishery bodies.

A draft budget for the funding required to support specific items of the secretariat of the FAO regional bodies for the effective provision of scientific advice is given in Annex 2. This is no more than a very rough guide, but it provides some measure of the finance needed (about one million dollars) and should be compared with the very much larger estimates of potential benefit (hundreds of millions). The sum needed is, however, far more than can be found within FAO's regular budget. The figures or relative costs and benefits should be drawn to the attention of national governments and of funding agencies such as UNDP, with the object of strengthening the Organization's work in this field.

When a regional body passes the formative stage, and especially when it faces the need for international regulation of the fisheries (which can, now, be very soon after the creation of the body) it needs perhaps to be more independent of international financing from sources outside the body itself. In order to give its member countries effective control of it and responsibility for its healthy progress, it is essential for the body to have a secretariat responsible to it, and perhaps preferably employed by it. The secretariat need not be large, but 2 or 3 trained and skilful professionals are needed on a continuing basis. The costs of supporting the secretariat should be borne at least in part by the member governments who are the main beneficiaries of action on good advice.

Many of the newer and poorer regional bodies will nevertheless need continued outside technical and financial assistance. Perhaps one way this could be achieved is by using financial aid from international or bilateral sources to employ persons at various levels of technical or scientific training on a short-term basis (1 to 3 years). These persons would be seconded from the member countries, during which time they would be responsible to the secretary of the regional body, assist in its work and attend its meetings. Subsequently, they would return to the member countries from which they came and would help those countries to provide the national data to, and effectively to participate in the work of, the regional body. They would also be in an excellent position to help policy-makers in their countries to understand the international scientific advice and the need for the measures that may be recommended.

Lastly, in considering the financing of international fishery bodies it should be borne in mind that the countries consuming, as well as those producing fish, as indeed the entire world community, have an interest in, and a responsibility for, continued productivity of fisheries and therefore might be expected to contribute to the costs of resource evaluation and of formulation of scientific advice.

6. INTERNATIONAL COOPERATION ON BROAD ASPECTS OF FISHERIES AND GENERAL MARINE PROGRAMMES

The rate of fisheries development has been extremely high during the past several decades, and until very recently fishing has been the major economic use of the natural resources of the ocean. The situation is, however, changing rapidly. Oil and gas are being sought on the continental shelf and slope areas, gravel is being widely exploited in inshore waters, and serious consideration is being given to exploitation of minerals on the deep sea-bed. In coastal areas, estuaries are being used for a variety of industrial and recreational purposes; and there are increased demands on the aquatic environment for disposal of industrial and human waste. There will be increasing multiple demands on the marine environment over the next several decades. These will increase the likelihood that at least some localized areas will be degraded and general biological production in the sea somewhat reduced. The seriousness of such problems will require effective mechanisms and interactions between relevant agencies dealing with the aquatic environment and user groups. It seems that more funds are likely to become available soon for monitoring and investigating the impact of pollution on the aquatic environment. Fisheries science has developed considerable experience in monitoring and evaluating changes which occur in the abundance of aquatic life. Fishery investigations provide the largest bio-assay capability for gauging the impact of environmental change on the living resources of the ocean. The relevant agencies dealing with ocean pollution should be aware of this capability, and encouraged to invest at least part of the funding available for pollution studies in relevant fishery research activities.

Management of fisheries will become more complex as intense, competitive interaction between different components of the fishing industries develops. Disturbances both by the intense harvest of various interacting stocks and by other human activities must be much better understood if management is to keep pace with the changing character of problems in rational use of ocean resources. With increasing demands, the scope of information required by decision-making bodies will intensify progressively. A number of on-going international programmes are related to those explicitly conducted in support of fishery development and management. It is essential that fisheries bodies take advantage of, and closely cooperate with, programmes in ocean science such as those coordinated by the Intergovernmental Oceanographic Commission (IOC) as a joint mechanism of a group of Agencies - UNESCO, FAO, WMO, IMCO and UN itself - and with other internationally coordinated activities which provide information on, or relevant to, the estuarine and coastal zones or other ocean environments and their resources. In this sense, certain activities sponsored by the International Council of Scientific Unions (ICSU) have been valuable in supplementing intergovernmental collaboration by mobilizing academic scientists - especially in connection with the methodology of marine science. It is most important for fishery bodies throughout the world to maintain close contact with such international activities, whether they be academic or "applied" in character, and to work to ensure that those aspects of aquatic science relevant to fisheries work receive adequate support. Similarly, fisheries bodies should be alert to new programmes in this area, and make their interests and expertise known to the appropriate agencies, so as to ensure best use of the overall funds, and a minimum of overlapping and competition.

7. CONCLUDING OBSERVATIONS

One of the most difficult problems of evaluating the scientific advisory systems of fishery bodies is that no person or organization has first hand experience with all of them or even with most of them. While a few governments are members of a considerable number of such bodies and thus have insight beyond what can be obtained from reading the statutes and reports (not all of which are in any case readily accessible), only FAO - among existing international organizations - has the possibility of

following the proceedings of most, if not all, of the bodies. Its staff have in the past gained much valuable experience from such participation. They have also on occasions been of service in drawing the attention of one body to relevant activities and decisions of other bodies. This vital role should be continued and developed, and the experience recorded and made accessible to others.

The valuable comparative study made for COFI, and subsequently published for general distribution, of the statutes, rules, decisions, and procedures of a number of international bodies should be updated from time to time. The FAO Department of Fisheries should keep a comprehensive archive of the documentation of all international fishery bodies. The Department should consider undertaking or commissioning special critical studies of aspects of the work of these bodies, based on the material and experience gathered. In this way FAO could provide a unique service to its Member States and especially to those which participate in only one or a few of the fishery bodies, most of which are developing countries. For this, as for other tasks, additional funds are required. It is emphasized, however, that the role of FAO goes much further than this. The UN Economic and Social Council, in its Resolution No. 1537 (LXX), has recognized the need for a global appraisal of ocean resource trends, and of the interactions between ocean uses. In another way this need has been reaffirmed by the UN Conference on the Human Environment (Stockholm, 1972) in its "Earthwatch" recommendations. No existing organization other than FAO can study world fisheries as a whole, as was so well demonstrated through the "World appraisal of fishery resources" carried out in recent years by the Department of Fisheries. Such an appraisal, which had many times been proposed as an FAO responsibility, only became possible when special funds became available within FAO for the Indicative World Plan (IWP) in the Agricultural Development. Now, as the trend towards over-exploitation reaches a crucial stage in more areas such a world-wide view will become even more important, because not only will pressure on the fishery resource generally increase, but the effects of developments in one area on what happens in others will become more acute. The preliminary appraisal must be continued and developed, being - as before - based on appraisals carried out by regional bodies. It is relevant both to the scientific advice needed by management and development bodies and to FAO functions which go beyond the terms of reference of the Working Party, such as the provision of a forum for the discussion of world fisheries problems of all kinds. This world-wide task, requires, however, like so many others to which attention has been drawn in this document, special budgetary provisions beyond the needs of the regional bodies themselves. The urgency for additional financing of the work of FAO and its Department of Fisheries is great; the need is clear, and the present provisions are quite inadequate.

Annex I

ACMRR Working Party on the
Scientific Advisory Function in International Fishery
Management and Development Bodies

Membership

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+ Regier, H.A.	University of Toronto Canada
+ Saetersdal, G. (Ex-officio, as Chairman of ACMRR)	Institute of Marine Research Bergen Norway
Tapias, C.	FAO Regional Office for Latin America Santiago, Chile

* Did not participate session of 13-18 November 1972

+ Attended seventh session of ACMRR

Several staff members of FAO participated in the session of the Working Party or in the critical discussion of its interim report at the seventh session of ACMRR; they were, especially H. Kasahara, J.A. Gulland, M. Ruivo, J-P. Troadec and E. Akyüz.

Annex II

Draft Budget for a Regional Fisheries Body

Here is given a tentative list of the total funds required annually to ensure that the regional fisheries bodies associated with FAO (CARPAS, CECAF, GFCM, IOFC, IPFC, EIFAC and CIFA) can carry out the minimum basic tasks required for the provision of scientific advice to these bodies on questions of fishery development and management. It has been assumed that the relevant activities of all the bodies would be carried out centrally by FAO; if they were carried out by each body separately the total costs would be slightly higher.

The activities that should be carried out by the secretariat that need financing include the following:

1. Compilation of data (a) catch
   (b) effort/c.p.u.e.
   (c) size/age composition

2. Direct requests and make visits to countries (not necessarily developing ones) to improve supply of data.

3. Some preliminary analysis of data by routine methods.

4. Arrangements for meetings of expert working groups, and payment of travel of some participants.

5. Participation by expert commission staff in activities of working groups.

6. Provision of some fellowships.

Requirements

Duties			
General	Director plus fellows	28 000*	28 000
1-2 (a) catches	Technical and clerical staff	84 000	
	Computer	50 000	
	Travel	10 000	144 000
(b) effort	Same as (a) + 50 percent		216 000
(c) size/age	Same as (b)		216 000
	Publications		20 000
3-5	Professional and clerical staff		70 000
4	10 Meetings (travel of some participants)		80 000
6	4 Junior Fellows		60 000
	Secretarial support, incidentals, etc.		60 000
		TOTAL	894 000

* Costs as at 1.1.73

Present Financing

Some of the activities described above are already being carried out by FAO. A rough estimate of the current annual work financed under the FAO Regular Budget (1972-73) is:

Duties - 1-2 (a)	Part-time professional and clerical staff	26 000
	Meetings	40 000
	Travel and incidentals	3 000
		69 000

This excludes the non-scientific activities involved in the general organization and running of the regional bodies.

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